

and receiver encased in a stock, a moveable bolt assembly positioned within the receiver, the bolt assembly being adapted to convey a round of ammunition from the receiver into the chamber of the barrel, the bolt assembly comprising a bolt body, a bolt handle capable of moving the bolt assembly among open, closed, and closed and locked positions, and an electrically conductive firing pin, a trigger assembly operatively connected to the bolt assembly, a voltage supply means, and a safety mechanism having at least a "safe" and "fire" position, the improvement comprising:

Column 2, Lines 29-31:

The instant invention further provides a process for firing electrically activated ammunition from [the] an electronic firearm, such as the example of an electronic firearm described above, comprising:

Column 2, Lines 66-67:

[Fig. 1 is a] Figs. 1 and 1A are side elevational [view] views of the invention.

Column 3, Lines 1-9:

[Fig. 2 is a] Figs. 2 and 2A are left rear elevational [view] views of a firearm of the present invention.

[Fig. 3 is a] Figs. 3 and 3A are wiring [diagram] diagrams of one embodiment of a firearm of the invention.

[Fig. 4 is a] Figs. 4 and 4A are cross sectional [view] views in elevation showing one embodiment of a bolt assembly and trigger assembly of a firearm of the present invention with the firing pin in its rearwardmost position.

Column 3, Lines 17-18:

[Fig. 8 is a] Figs. 8 and 8A are cross sectional [view] views in elevation showing the bolt assembly of [Fig. 4] Figs. 4 and 4A with the firing pin biased forward.

Column 3, Lines 21-24:

[Fig. 10 is a] Figs. 10 and 10A are fragmental top plan [view] views of a firearm of the present invention with the barrel assembly removed.

[Fig. 11 is a] Figs. 11 and 11A are fragmental exploded [view] views of a firearm of the present invention.

Column 3, Lines 31-36:

The description below pertains to one embodiment of an operational sequence that can be utilized by a system control means of a firearm of the present invention. [Variations] The present invention can be used with a variety of different types of firearms, and variations and modifications of this operational sequence can be substituted without departing from the principles of the invention, as will be evident to those skilled in the art.

Column 7, Lines 1-6:

FIGS. 1 through 11 show various aspects of possible example embodiments of a firearm of the present invention that can be adapted to utilize the operational sequence described above. [Variations] The present invention can be adapted for use with a variety of different types of firearms and variations and modifications of these embodiments can be substituted without departing from the principles of the invention, as will evident to those skilled in the art.

Column 7, Lines 7-21:

In FIGS. 1 through 11, an example embodiment of the present invention is illustrated, in which the firearm has a barrel 10 that is attached to receiver 11, and a stock 12. The stock consists of a forearm 12A at a forward portion thereof, a pistol grip 12B at a middle portion, and a butt 12C at a rearward portion thereof. Both the barrel and receiver are encased in the forearm 12A of the stock 12. The barrel has a chamber formed in its rear end where it is attached to the receiver. The chamber is connected and adapted to receive ammunition from the receiver. A bolt assembly, generally indicated as 20, is movably positioned within the receiver, behind and substantially aligned with the barrel, and has a handle 21. The barrel 10, receiver 11, bolt assembly 20, and trigger assembly 40 comprise the barrel assembly of the firearm. A safety switch [14,] 13 (FIGS. 1A, 2A, 3A, 10A and 11A) is shown behind the bolt assembly, which is shown in FIGS. 1, 1A and 2, 2A in a closed and locked position.

Column 7, Line 54 – Column 8, Line 2:

The system control means shown comprises voltage increasing means 5, an electronic switching means 5A (Fig. 3A), and means for detecting the presence of a round of ammunition 6 within the chamber. The embodiment of the voltage increasing means shown comprises a boost converter to increase the voltage from the battery to the level necessary to initiate the ammunition, for example, from 9 volts, if a battery of that voltage is used as the power source, to a voltage sufficient to initiate the electrically primed ammunition. The voltage increasing means typically comprises inductors, diodes, capacitors and switches, the arrangement of which is dependent on the specific boost converter used. Other embodiments may use converters other than the boost topology. Variations and modifications of these embodiments can be substituted without departing from those principles of the invention, as will be evident to those skilled in the art.

Column 9, Lines 23 – 32:

In addition, the firing pin plug and the firing pin are adapted to be adjustably connected, such as by the engagement of threads 28A (Figs. 4A and 8A) about the firing pin plug 28, with a corresponding thread 28B formed on the rearward area of the firing pin 29, thus permitting individual adjustment of the firing pin in relation to the firing pin plug so that the forward tip of the firing pin is adjustable with respect to the bolt face when the firing pin is biased into its rearwardmost position, thus supporting the primer cap in the ammunition during firing and preventing the firing pin from becoming lodged within the bolt body when it is forced rearward by the ignition of a round of ammunition within the chamber, as shown in [Fig. 4] Figs. 4 and 4A.

Column 11, Line 66 – Column 12, Line 5:

The electronically controlled and operated component parts of the firearm of the present invention[, including] include, for example, the bolt assembly, trigger assembly, voltage increasing means, electronic safety, status indicator, blind mate circuitry connections, system authorization switch, and electronic switching means for isolating the firing pin also provide desirable advantages.

Column 12, Lines 20 – 35:

The electronic switching means allows the system control to isolate the firing pin and safely discharge the voltage increasing means through a secondary path upon detection of a malfunction, such as by discharging the voltage in the voltage increasing means to ground as is known in the art. The electronic switching means also permits the system control to isolate the firing pin if the firearm has been inactive for a period of time, or other conditions specified, including the absence of a round of ammunition within the chamber of the barrel; the firearm's safety being in the safe position; the bolt being in the unlocked position; the bolt being in the open position; the turning off of the system authorization switch; the detection of a level of voltage from the voltage supply means falling below a predetermined level; the passing of a predetermined period of inactivity of the firearm; and the failure or malfunction of the system control means or any component connected thereto.

IN THE CLAIMS

Claims 1 – 9, 11 – 32, 34, 35 and 37 - 40 as originally filed and issued and new claims 41 – 43, 45 – 61, 64 – 69, 73 – 75, 85 – 87, and 89 – 90 are pending in this case.

Please cancel original claims 10, 33, and 36, and previously submitted new claims 44, 62, 63, 70 – 72, 76 – 84 and 88 without prejudice or disclaimer.

Pursuant to 37 C.F.R. § 1.121(b)(2), please amend the claims as follows:

1. (Three Times Amended - Pending) In an electronic firearm for firing electrically activated ammunition, comprising a barrel [attached to a receiver], a chamber formed in the barrel [adjacent to the receiver, the receiver being] and adapted to receive at least one round of electrically fired ammunition, [the barrel and receiver encased in a stock, a moveable bolt assembly positioned within the receiver, the bolt assembly being adapted to convey a round of ammunition from the receiver into the chamber of the barrel, the bolt assembly comprising a bolt body, a bolt handle capable of moving the bolt assembly among open, closed, and closed and locked positions, and] an electrically conductive firing pin, a trigger assembly [operatively connected to the bolt assembly, and], a voltage supply means, and a safety mechanism [having at least a safe and fire position], the improvement comprising:

A. A system control means receiving power from the voltage supply means, programmed to control firing upon actuation of the trigger assembly, [safety, power conservation, and diagnostic functions,] the system control means comprising:

- i. Voltage increasing means connected to transmit increased voltage to the firing pin;
- ii. Switching means for isolating the firing pin from the voltage increasing means, and the voltage increasing means from the

voltage supply means, the switching means being activated upon the occurrence of at least one condition selected from:

- a. the absence of a round of ammunition within the chamber of the barrel;
 - b. the safety mechanism being in [the] a safe position;
 - [c. the bolt being in the unlocked position;]
 - [d. the bolt being in the open position;]
 - [e.] c. the passing of a predetermined period of inactivity of the firearm; and
 - [f.] d. the failure or malfunction of the system control means or any component connected thereto;
- [iii. Means for electronically detecting the presence of a round of ammunition within the chamber of the barrel;]
- [iv. Means for monitoring the capacity of the voltage supply means; and]
- [v.] iii. Electronic safety operatively connected to the safety mechanism for preventing voltage from reaching the firing pin when the safety mechanism is in the safe position and for preventing the system control means from detecting a trigger pull when the safety mechanism is in the safe position[;].

- [B. Electronic trigger switch operatively connected to the trigger and the system control means, the electronic trigger switch adapted to send a signal to the system control means when the trigger is pulled;]
- [C. Electrical isolation means insulating the body of the firing pin, the firing pin having a forward conductive end and a rearward conductive area, the forward conductive end positioned to transmit voltage to a round of ammunition within the chamber of the barrel only when the bolt assembly is in a closed and locked position, the rearward conductive area positioned to receive voltage only when the bolt assembly is in the closed and locked position and;]
- [D. At least one indicator operatively connected to the system control means.]

2. (Twice Amended - Pending). A firearm of claim 1 [wherein the] and further including a bolt assembly [has] having front and rear ends and which is movably positioned within [the] a receiver, positioned behind and substantially aligned with the barrel, the bolt assembly comprising a hollow bolt body operatively connected at its rear end to a hollow bolt plug, a bolt handle on the rear of the bolt assembly, [a movable firing pin assembly within the bolt body having forward and rearward ends,] and a firing pin spring to bias the firing pin [assembly] forward by acting between the bolt plug and [the rear] a rear end of the firing pin [assembly].

3. (Amended – Pending) A firearm of claim 2 wherein the bolt plug is sealed at its rear end, and [the firing pin assembly within the bolt body comprises] further comprising a firing pin plunger [at its rearward end, the firing pin plunger] positioned within the bolt plug and operatively connected to a firing pin plug, a firing pin plunger insulator between the firing pin plunger and the firing pin plug, [and a firing pin at the forward end of the firing pin assembly, a] with the firing pin spring positioned between the sealed rear end of the bolt plug and the [rearward] rear end of the firing pin plunger to bias the firing pin forward by acting on the firing pin plunger, a firing pin shoulder within the front end of the bolt body positioned to restrict the forward movement of the firing pin, the rearward movement of the firing pin being limited by the plunger contacting the rear of the bolt plug, a bolt head operatively connected to the front end of the bolt body having lugs positioned to engage slots extending from the front of the receiver into the rear of the chamber of the barrel, a firing pin contact at the rear end of the bolt assembly positioned to connect the rearward conductive area of the firing pin with an electrical contact on [a] the trigger assembly when the bolt assembly is in the closed and locked position, a bolt plug assembly comprising the hollow bolt plug, a bolt plug detent on the bolt plug, a bolt plug detent spring positioned between the bolt plug and the bolt plug detent to bias the bolt plug detent forward, and a projection on the bolt plug detent positioned to engage the trigger assembly when the bolt is closed.

5. (Three Times Amended – Pending). A firearm of claim 3 wherein the firing pin plug is a threaded firing pin adjustment screw adapted to fit into a threaded aperture in the rear end of [the bolt plug, and] the firing pin [assembly comprises the firing pin adjustment screw at its rearward end, the screw operatively connected to a firing pin plunger], and wherein the firing

pin plug is [at a forward end of the firing pin assembly] operatively connected to the firing pin plunger, [and a] with the firing pin plunger insulator between the firing pin plunger and the firing pin [plunger] plug, the firing pin [assembly being] is biased forward by the firing pin spring acting on the firing pin plunger and the rear of the bolt plug.

14. (Amended - Pending). A firearm of claim 1 [wherein the] and further comprising means for electronically detecting the presence of a round of ammunition within the chamber of the barrel [comprises], including at least [two electrodes] one electrode positioned to contact electrically conductive portions of a round of ammunition within the chamber.

15. (Amended – Pending). A firearm of claim 14 wherein said at least one electrode [is] comprises the firing pin.

19. (Amended - Pending). A firearm of claim 1 [wherein the] and further including an electrical isolation means [comprises] comprising a modification of [the] a surface of the firing pin.

20. (Amended – Pending). A firearm of claim [16] 19 wherein the surface modification comprises ion implantation.

21. (Amended - Pending). A firearm of claim [1] 19 wherein the electrical isolation means comprises an insulating coating.

25. (Amended - Pending). A firearm of claim 1 [wherein the] and further including an electrical isolation means [comprises] comprising an insulating sleeve surrounding the firing pin.

30. (Twice Amended - Pending). A firearm of claim 1 and wherein the system control means and electronic safety are adapted to isolate the firing pin when the safety mechanism is in the safe position by rejecting signals received from the trigger [switch] assembly (a) when the trigger assembly is [pulled] activated, and (b) when the trigger assembly is [pulled] activated and held while the safety mechanism is switched from the safe position to [the] a fire position.

31. (Amended – Pending). A firearm of claim 1 wherein the system control means is adapted to cause energy stored in the voltage increasing means to be diverted [to a secondary discharge path] upon isolation of the firing pin.

38. (Four Times Amended - Pending). In a process for firing electrically activated ammunition from an electronic firearm comprising a barrel [attached to a receiver], a chamber formed in the barrel [adjacent to the receiver, the receiver being] and adapted to receive at least one round of electrically fired ammunition, [the barrel and receiver encased in a stock, a moveable bolt assembly positioned within the receiver, the bolt assembly being adapted to convey a round of ammunition from the receiver into the chamber of the barrel, the bolt

assembly comprising a bolt body, a bolt handle capable of moving the bolt assembly among open, closed, and closed and locked positions, and], an electrically conductive firing pin, a trigger assembly [operatively connected to the bolt assembly], a voltage supply means for supplying a voltage to the firing pin, and a safety [having at least a safe and a fire position], the improvement comprising:

- A. Controlling and coordinating [all firing, safety, power conservation, and diagnostic functions, and regulating] the distribution of power to the firing pin through a system control by;
 - i. [Increasing the voltage from the voltage supply means, and] [regulating] Regulating the transmission of [the increased] voltage to the firing pin;
 - ii. Conserving power by isolating the firing pin from [the voltage increasing means, and the voltage increasing means from] the voltage supply means, upon the occurrence of at least one condition selected from:
 - a. the absence of a round of ammunition within the chamber of the barrel;
 - b. the safety being in [the] a safe position;
 - [c. the bolt being in the unlocked position;]
 - [d. the bolt being in the open position;]
 - [e.] c. the passing of a predetermined period of inactivity of the firearm;

- d. a system authorization switch being in an off position;
- [f.] e. the failure or malfunction of the system control means or
any component connected thereto; and
- [iii. Electronically detecting the presence of ammunition within the
chamber of the barrel;]
- [iv. Monitoring the capacity of the voltage supply means; and]
- [v.] iii. Preventing voltage from reaching the firing pin when the safety is in the
safe position and preventing the system control from accepting [the] a
signal from the trigger [switch] assembly generated by [a trigger pull]
actuation of the trigger assembly when the safety is in the safe position[;]
- [B. Sending a signal to the system control means when the trigger is pulled; and]
- [C. Indicating the status of the firearm].

39. (Amended - Pending). A process of claim 38, further comprising detecting the presence of a round of ammunition within the chamber, and determining whether a detected round of ammunition within the chamber is viable.

40. (Amended – Pending). A process of claim 38 further comprising [visually] indicating the status of the firearm.

Please add the following new claims:

41. (New - Pending). A process of claim 38 and further including electronically detecting the presence of a round of ammunition within the chamber of the barrel.

42. (New - Pending). A process of claim 38 and further including monitoring the capacity of the voltage supply means.

43. (New - Pending). A process of claim 38 and further including preventing voltage from reaching the firing pin when the safety is in a safe position.

45. (New - Pending). The firearm of claim 1 and further including at least one indicator operatively connected to the system control means.

46. (New - Pending). The firearm of claim 1 and wherein the firing pin includes a forward conductive end for transmitting voltage to a round of ammunition within the chamber, and a rearward conductive area to receive voltage from the voltage increasing means.

47. (New - Pending). An electronic firearm, comprising:
a barrel;
a chamber in which a round of electrically fired ammunition is received;
a conductive firing pin for transmitting power to the round of ammunition;
a voltage supply for supplying power for initiating firing of the round of ammunition;

a system control powered by said voltage supply and monitoring the firearm, for controlling the firing of the round of ammunition, said system control including a switching means for isolating said firing pin from receiving power supplied by said voltage supply upon the occurrence of at least one of the following conditions:

- a. insufficient energy to initiate the firing of the round of ammunition;
- b. detection of voltage from said voltage supply below a predetermined level;
- c. detection of voltage from said voltage supply above a predetermined level;
- d. absence of a round of ammunition in said chamber;
- e. lack of viability of the round of ammunition;
- f. inactivity of the firearm for a predetermined time;
- g. a system authorization switch being in an off position; and
- h. failure of the system control or any component connected thereto;

a trigger assembly communicating with said system control and having a trigger, whereby as said trigger is activated, a signal is sent to said system control to initiate firing of the round of ammunition; and

said system control further including an electronic safety operatively connected to a firearm safety mechanism and responsive to activation of said firearm safety mechanism for preventing power from reaching said firing pin and preventing said system control from detecting activation of said trigger.

48. (New - Pending). The electronic firearm of claim 47 and wherein said system control further comprises a voltage increasing means for increasing voltage received from said voltage supply to a voltage sufficient to initiate the firing of the round of ammunition.

49. (New - Pending). The electronic firearm of claim 48 and wherein said switching means isolates said voltage supply from said voltage increasing means.

50. (New - Pending). The electronic firearm of claim 48 and wherein said switching means isolates said voltage increasing means from said firing pin.

51. (New - Pending). The electronic firearm of claim 47 and further comprising an indicator communicating with said system control for indicating the status of the firearm.

52. (New - Pending). The electronic firearm of claim 47 and further comprising a system authorization switch communicating with said system control for controlling access to the firearm.

53. (New - Pending). The electronic firearm of claim 47 and further comprising an insulating coating applied to said firing pin.

54. (New - Pending). The electronic firearm of claim 47 and further comprising an insulating sleeve positioned about said firing pin.

55. (New – Pending) The electronic firearm of claim 47 and wherein said system control and electronic safety are adapted to isolate said firing pin when said firearm safety mechanism is in a safe position by rejecting signals received from said trigger (a) when said trigger is activated, and (b) when said trigger is activated and held while said firearm safety mechanism is moved from a safe position to a fire position.

56. (New - Pending). The electronic firearm of claim 47 and further including means for electronically detecting the presence of a round of ammunition in said chamber.

57. (New - Pending). The electronic firearm of claim 47 and wherein said firearm safety mechanism is movable between a fire and a safe position for placing the firearm in a nonoperative condition upon movement of said firearm safety mechanism to said safe position.

58. (New - Pending). The electronic firearm of claim 47 and wherein said system control includes programming to monitor and control the firearm including initiating the sleep mode for the firearm to place the firearm in a nonoperative condition.

59. (New - Pending). The electronic firearm of claim 47 and wherein said system control comprises at least one of the following: a microprocessor, microcontroller, software, firmware, microcode, digital logic, analog logic, and custom integrated logic.

60. (New - Pending). An electronic firearm, comprising:
a barrel;
a chamber in which a round of electrically initiated ammunition is received;
a firing pin;
a trigger for initiating firing of the round;
a voltage supply for supplying power to said firing pin for firing the round;
a system control for monitoring the firearm and controlling the power supplied to said firing pin in response to at least one condition selected from:

- a. insufficient energy to initiate the firing of the round of ammunition;
- b. detection of voltage from said voltage supply below a predetermined level;
- c. detection of voltage from said voltage supply above a predetermined level;
- d. inactivity of the firearm for a predetermined time;
- e. a system authorization switch being in an off position; and
- f. failure of said system control or any component connected thereto;

said system control including a switching means for isolating said firing pin from said voltage supply to prevent the firing of the round of ammunition, and an electronic safety responsive to activation of a firearm safety for isolating said firing pin and preventing said system control from receiving a signal responsive to activation of said trigger.

61. (New - Pending). The electronic firearm of claim 60 and further including a voltage increasing means connected to said voltage supply and said firing pin for transmitting an increased voltage to said firing pin for firing the round of ammunition.

64. (New - Pending). The electronic firearm of claim 60 and further comprising at least one indicator communicating with said system control means for indicating the status of the firearm.

65. (New - Pending). The electronic firearm of claim 60 and wherein said firing pin comprises a forward conductive end for transmitting voltage to a round of ammunition within the chamber, and a rearward conductive area to receive voltage from the voltage supply.

66. (New - Pending). The electronic firearm of claim 60 and wherein said firing pin further includes an insulating coating applied thereto.

67. (New - Pending). The electronic firearm of claim 60 and further including an insulative sleeve positioned about said firing pin.

68. (New - Pending). The electronic firearm of claim 60 and further including a means for detecting the presence of a round of ammunition in said chamber.

69. (New - Pending). The electronic firearm of claim 60 and further comprising a system authorization switch communicating with said system control means for controlling access to the firearm.

73. (New - Pending). A method of firing a round of electrically-initiated ammunition from an electronic firearm, comprising:

Monitoring a sequence of operative conditions with a system control;

Sending a signal to the system control upon activation of a trigger;

Controlling and coordinating distribution of power to a firing pin, including isolating and preventing the firing pin from receiving power upon the occurrence of at least one condition selected from:

- a. the firearm being in a sleep mode;
- b. insufficient energy to initiate the firing of the round of ammunition;
- c. detection of voltage from a voltage supply below a predetermined level;
- d. detection of voltage from a voltage supply above a predetermined level;

- e. absence of a round of ammunition in a chamber of the firearm;
- f. lack of viability of the round of ammunition;
- g. inactivity of the firearm for a predetermined time;
- h. failure or malfunction of the system control or any component connected thereto;
- i. a system authorization switch being an in off position;
- j. a safety mechanism of the firearm being in a safe position;

Preventing the system control from accepting a signal from the trigger generated by a trigger pull when the safety mechanism of the firearm is in the safe position;

Transmitting power to the firing pin from the voltage supply for transmission to the round of ammunition; and

Applying power to the round of ammunition.

74. (New - Pending). The method of claim 73 and wherein controlling and coordinating distribution of power to the firing pin includes increasing voltage in a voltage increasing means.

75. (New - Pending) An electronic firearm, comprising:

- a barrel;
- a chamber in which a round of electrically initiated ammunition is received;
- a firing pin;
- a trigger for initiating firing of the round;

a voltage supply for supplying power to said firing pin for firing the round;

a system control for monitoring the firearm and controlling the power supplied to said firing pin in response to malfunction or failure of the system or any component connected thereto, said system control including a switching means for isolating said firing pin from said voltage supply to prevent the firing of the round of ammunition; and
a means for detecting the presence of a round of ammunition in the chamber.

85. (New - Pending). A method of firing a round of electrically-initiated ammunition from a firearm, comprising:

receiving a round of ammunition within a chamber;

sending a signal to a system control to initiate firing of the round of ammunition as a trigger is activated;

supplying power from a voltage supply for initiating firing of the round of ammunition;

electronically detecting the round of ammunition within a chamber of the firearm;

monitoring the firearm with the system control and controlling the firing of the round of ammunition with the system control;

isolating a firing pin of the firearm from receiving power supplied by the voltage supply upon the detection of at least one of the following conditions by the system control:

a. insufficient energy to initiate the firing of the round of ammunition;

- b. detection of voltage from the voltage supply below a predetermined level;
 - c. detection of voltage from the voltage supply above a predetermined level;
 - d. absence of a round of ammunition in the chamber;
 - e. inactivity of the firearm for a predetermined time;
 - f. an authorization switch being in an off position; and
 - g. failure of the system control or any component connected thereto;
- and
- transmitting power to the round of ammunition through the firing pin.

86. (New - Pending). The method of claim 85 and further comprising increasing the voltage from the voltage supply to a level sufficient to initiate the firing of the round of ammunition, in a voltage increasing means, and isolating the voltage supply from the voltage increasing means.

87. (New - Pending). The method of claim 86 and further comprising isolating the voltage increasing means from the firing pin.

89. (New - Pending) The method of claim 85 and further comprising detecting viability of the round of ammunition in said chamber.